ABSTRACT for the 2015 ISA WWAC Symposium

Process Control for Precipitation Prevention in Space Water Recovery Systems

Subtitle if applicable

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ABSTRACT

The ability to recover and purify water through physiochemical processes is crucial for realizing long-term human space missions, including both planetary habitation and space travel. Because of their robust nature, rotary distillation systems have been actively pursued by NASA as one of the technologies for water recovery from wastewater primarily comprised of human urine. A specific area of interest is the prevention of the formation of solids that could clog fluid lines and damage rotating equipment. To mitigate the formation of solids, operational constraints are in place that limits such that the concentration of key precipitating ions in the wastewater brine are below the theoretical threshold. This control in effected by limiting the amount of water recovered such that the risk of reaching the precipitation threshold is within acceptable limits. The water recovery limit is based on an empirically derived worst case wastewater composition. During the batch process, water recovery is estimated by monitoring the throughput of the system. NASA Johnson Space Center is working on means of enhancing the process controls to increase water recovery. Options include more precise prediction of the precipitation threshold. To this end, JSC is developing a means of more accurately measuring the constituent of the brine and/or wastewater. Another means would be to more accurately monitor the throughput of the system. In spring of 2015, testing will be performed to test strategies for optimizing water recovery without increasing the risk of solids formation in the brine.

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